



Build and test a muscle model

Autumn 1 · Week 4 · Lesson B · 40 minutes

Learning objective

Construct or direct a safe card-arm model, demonstrate both muscle roles and evaluate a model limitation.

Evidence to look for

Record the pupil decision or explanation and the support used. Accept pointing, signing, adult scribing or directing the model. A photograph alone does not establish understanding; no photography or public sharing is required.

Source lesson timing

Elapsed minutes	Source stage	Minutes
0–32	Independent Work	32
32–36	Lundy Loop	4
36–40	Exit Ticket	4

Split slide times are added within their original source stages. Printed tasks and adaptations replace activity within these timings; they do not add extra lesson time.

Equipment and preparation

- Adult-prepared card strips, pre-made holes and secured split pin
- Two loose strings and opposite-side forearm tabs; prepared demonstration fallback
- Biceps, triceps, CONTRACTS and RELAXES labels; pupil record

**TEACHING SEQUENCE**

Guide the lesson

Use the source stage times; choose prompts appropriate to the pupil.

Slide 1: Build and test a muscle model · 0 minutes

Wednesday P2, 10:10-10:50. Reference screen only; start the 32-minute workshop immediately. No additional starter or lesson time.

Slide 2: Retrieve the pair and check the join · 4 minutes

Four-minute preparation. Adult checks two card strips, pre-made holes, secured split pin and two loose strings fixed to opposite-side forearm tabs. If apparatus is not ready, use adult's prepared model; pupil direction retains the scientific goal.

Slide 3: Build with an adult's preparation · 5 minutes

First five minutes of 20-minute workshop. Adult cuts strips, makes holes and fits the split pin so elbow rotates without sharp points. Attach pull strings on opposite sides of forearm near elbow; adult checks one gentle pull bends and another straightens before use. No stretched elastic or strings tied to body. Demonstration model is fallback if a mechanism fails.

Slide 4: Make one careful bend · 5 minutes

Next five minutes. Pupil may tell adult which string to pull and where to put labels. The pulling string represents effect of biceps shortening, not a living contracting muscle. Do not increase force if card jams; pause for adult adjustment.

Slide 5: Actively straighten and swap roles · 5 minutes

Next five minutes. Explicitly teach active straightening in the model rather than passive dropping under gravity. Adult checks the opposite-side pull works safely. A card model that needs manual repositioning can still support label explanation; state the limitation, do not fake successful mechanism.



TEACHING SEQUENCE / CONTINUED

Guide the lesson - continued

Keep the source stage times; pause and check understanding as needed.

Slide 6: Explain both actions with labels · 5 minutes

Final five minutes of 20-minute phase. Check that labels follow muscle names rather than card colours or screen position. Support: adult reads answer options; standard complete pair statement; stretch compare what string and living muscle do.

Slide 7: Pause and check your model · 2 minutes

Source two-minute pause. Adult adjusts any insecure pin or jam. Pupil can direct. Record the scientific reason for a label correction, not simply “teacher said”.

Slide 8: Improve, explain and tidy · 6 minutes

Final six-minute phase includes improvement, explanation and tidy. Scientific limit: string is pulled by a person rather than contracting; card/pin simplify anatomy and omit nerves/tendons. Adult repairs mechanism, pupil owns the classification/explanation. Keep small parts secured.

Slide 9: Your voice can change the lesson · 4 minutes

Four minutes within the source lesson. Receive an actual observation or access request; do not force a peer audience. Name what can change now, make the change where possible and check whether it helped. The adult receives and names back the science shown as well as access feedback.

Slide 10: What does the pair do? · 4 minutes

Answer key in teacher notes only: bend biceps contracts, triceps relaxes. Active straighten triceps contracts, biceps relaxes. Opposing muscles/pulls provide opposite active movement because muscles pull rather than push. Accept a directed demonstration with pupil meaning. Record next step without compulsory written closing line.

**TEACHER ANSWERS**

Worked answers and expected evidence

Use after an attempt. Accept equivalent correct explanations; record support given.

1. Build or direct the safe model

Credit scientific direction as well as manual construction. The adult checks secure pin, gentle rotation, loose string and safe two-direction action. No pupil operating failed apparatus or manipulating sharp split pins.

2. Record the two actions

Bend: biceps contracts/triceps relaxes. Active straighten: triceps contracts/biceps relaxes. Observation must describe actual model action; if joint jammed state so, then use a prepared model or label diagram.

3. Check, improve and explain

Useful checks: swapped role labels, inadequate turning join, pulling from wrong side. String does not contract itself; model is card/pin, not living tissue. A label/explanation improvement is sufficient if model already functions.

4. Feedback and exit

Bend biceps contracts; active straighten triceps contracts and biceps relaxes. Muscles exert pulls, not pushes, so an opposing pull changes active direction. Qualify to this simplified elbow model.

Misconceptions and corrections

- Model construction alone proves the science: pupil must connect actions and labels.
- A model string is an actual muscle: it represents a pull and does not shorten itself.
- Relaxed means missing or broken: it is the partner role in this simplified movement.



Teach safely; keep the evidence

The source record identifies this conversion; it is not a claim of publication.

Safety

- Adult cuts, holes and secures all small/sharp parts before pupils use the model.
- Loose strings only; no elastic under tension, no knots around bodies/fingers, gentle table-based pulls.
- Stop if the mechanism jams; adult checks and adjusts it.
- Offer prepared model, diagram or adult-directed route; no compulsory body movement.

Access and offline alternatives

- Use adult-prepared model and point to or direct labels for each action.
- Build or direct both moves and explain the two muscle roles.
- Compare model with living muscle and justify a precise improvement.
- Adult receives one real pupil observation or access request, acts on a feasible change and explains limits. A learner can pass privately.

Close and continue

Finish at 40 minutes: workshop 32, pupil feedback 4, exit 4. Record one next teaching step based on the actual response.

Source and revision

Repository: MattRoper1977/Lessons

Source path: Science_Teesside/Build/SCI_B_W4_Muscle_Pairs.html

Source file Git blob: 25c277b919c5fcc62a4891abf2f7cbecf4999396

Current source link (mutable): https://github.com/MattRoper1977/Lessons/blob/main/Science_Teesside/Build/SCI_B_W4_Muscle_Pairs.html

Document revision: 2026-09-06

Uploaded supporting sources

- White Rose Education, Year 3 Autumn Block 2 (2024): Movement, steps 1 Joints and 2 How we move. Public materials use original text and native diagrams; the accepted website string model replaces source stretched elastic.

Recorded conversion changes

- Original editable classroom text, scientific diagrams and pupil tasks follow the current weekly HTML, not the older retained A/B teaching version.
- White Rose uploads inform concepts and task choices; no publisher-owned slide, photograph, worksheet page or video is redistributed in these public files.
- Website animations and drag-and-drop controls become teacher-led reveals, movable paper labels and accessible spoken/drawn responses. No internet connection or video is needed.
- Autumn 1 Weeks 1-2 were baseline assessment. This is a Weeks 3-7 teaching pack, not a claim that baseline assessments or the separate Week 8 enrichment are included.